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ENVIRONMENT PROJECT PRELIMINARY FINDINGS - BARRIERS

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The BART Impact Program is a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART).

The program is being conducted by the Metropolitan Transportation Commission, a nine-county regional agency established by state law in 1970.

The program is financed by the U. S. Department of Transportation, the U. S. Department of Housing and Urban Development, the National Science Foundation, and the California Department of Transportation. Management of the Federally-funded portion of the program is vested in the U. S. Department of Transportation.

The BART Impact Program covers the entire range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and life styles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors will be measured and analyzed. The benefits of BART, and their distribution, will be weighed against the negative impacts and costs of the system in an objective evaluation of the contribution that the rapid transit investment makes toward meeting the needs and objectives of this metropolitan area and all of its people.

DOCUMENT NO. TM 12-4-75 DOT-OS-30176

ENVIRONMENT PROJECT
PRELIMINARY FINDINGS
BARRIERS

MARCH 1975
TECHNICAL MEMORANDUM

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PRELIMINARY FINDINGS
BARRIERS

THE ENVIRONMENT PROJECT

BART IMPACT PROGRAM

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PREPARED BY GRUEN ASSOCIATES, INC.
DE LEUW, CATHER & CO.
UNDER CONTRACT WITH THE METROPOLITAN TRANSPORTATION COMMISSION
FOR THE U. S. DEPARTMENT OF TRANSPORTATION
AND THE U. S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
UNDER CONTRACT DOT-OS-30176, TASK ORDER 4
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The construction of the BART system inevitably resulted in changes to patterns of vehicular and pedestrian movement. This preliminary analysis assesses the effect of BART facilities on the ease and hindrance of vehicular and pedestrian movement in areas adjacent to BART lines and stations. The assessment describes and quantifies the relationship between BART and other transportation facilities (freeways, railroads and arterials) acting as barriers. It also includes a description of the extent and locations where BART has created new barriers to pedestrian and vehicular movement patterns, and goes on to describe how BART has tried to mitigate barrier impact.

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PRELIMINARY FINDINGS
BARRIERS

INTRODUCTION

The construction of the BART system inevitably resulted in changes to patterns of vehicular, and pedestrian movement. These changes consist of both improvements in movement and restrictions to movement. While such changes have been regarded by BART's planners and designers as necessary trade-offs for the improved access and ease of movement provided by the transit system itself, the effect of BART on local and regional movement is often an important impact on the environment.

The overall objective of the barrier analysis is to assess the effect of BART facilities on the ease and hindrance of pedestrian, vehicular and shipping movement in areas adjacent to BART lines and stations. Subway construction impacts on downtown traffic, impacts on regional movement, and some effects on local utility networks have also been analyzed.

Prior barrier conditions related to existing transportation facilitie and BART-related physical changes have been mapped (Appendix B). This mapping has been developed from aerial photographs (pre and post BART construction), field reconnaissance and meetings and discussions with BART staff members and officials of the three operating railroads adjacent to portions of BART's alignment.

Data on changes in vehicular and pedestrian movement patterns and volumes will be collected and analyzed later in the Phase I study.

It is anticipated that such changes have occurred as a result of BART's construction, and may be significant.

This study is intended as an early report on barrier impact findings. It includes a complete description of barrier/access phenomena along the BART system and a partial analysis of the effects of these phenomena. A more complete assessment will be presented later in the Phase I effort, when findings from other impact category studies, such as safety, security and appearance, as well as detailed data on traffic changes resulting from BART's construction, become available.

SCOPE OF STUDY

The scope and structure of the analysis of barriers as an environmental impact is set forth in the Environment Project Research Plan. The research questions provide the basis for data collection, analysis and findings.

The first five of the six barrier research questions shown below are addressed in this preliminary report on barriers. The details and implications of traffic changes (Question #6) as well as further supporting data for all of the research questions will be part of the final Phase I Environment Project Report.

1. What is the relationship between previous transportation facilities acting as barriers and BART?
2. Which BART line and station configurations have created barriers? Which have improved access and ease of movement?
3. To what extent and where have local streets and pedestrian paths been blocked or eliminated by BART?

4. To what extent and where have improvements to vehicular and pedestrian facilities resulted from the construction of BART?
5. What effect, if any, has the existence of the Trans-bay Tube had on maritime activity on the Bay?
6. What measurable changes in vehicular and pedestrian flows have resulted from BART changes in local and regional movement patterns?

This study was conducted by first identifying areas of potential barrier creation by BART and areas of prior barriers paralleling the BART alignment, then noting changes in movement facilities in the vicinity of BART. Sources of this information were aerial photos before and after the construction of BART, BART track configuration diagrams and interviews with representatives of BART and local jurisdictions.

ANALYSIS

Research Question 1: What is the relationship between previous transportation facilities acting as barriers and BART?

Transportation facilities which can serve as potential barriers consist of freeways, railroads, and major traffic arteries. These facilities affect BART's barrier potential in several ways.

The most restrictive facility, in terms of effect on cross-movement, is freeway at-grade. Railroads vary according to the level of traffic they carry. Characteristically railroad tracks are not fenced and, for the most part, are not grade separated. These two factors affect their potential as barriers. Major arterials create some barrier effect, but usually include frequent crossings by intersecting streets.

Strong prior transportation barriers, such as freeways and heavily traveled railroads, have influenced the development of the areas surrounding them. Crossings of these facilities have been avoided and adjacent development has often "backed up" to them to minimize access conflicts. Examples of this exist along the Southern Pacific and Western Pacific Railroad south of the BART station in Hayward.

Where previous transportation facilities do not act as significant barriers, such as lightly traveled railroads and arterials, cross movements are frequent and movement patterns do not generally reflect the presence of the facility as a barrier. This condition is exemplified by development along the Santa Fe tracks between the North Berkeley and El Cerrito del Norte BART stations.

Approximately 85% of BART's alignment coincides with a previous transportation facility. Table 1 shows the various kinds of facilities and BART's configuration in relationship to them. Figure 1 shows the few parts of the BART system not adjacent to parallel transportation facilities.

From Table 1 it can be seen that:

- BART subway configuration is used primarily in areas with parallel arterial alignments, and is associated with heavy cross-traffic.
- BART surface configuration has been used predominantly in areas where previous strong barriers (freeways and heavily used railroads) exist.
- BART aerial structures are used in areas of extensive surrounding movement patterns, along both arterials and railroads.

TABLE 1

QUANTITATIVE RELATIONSHIP BETWEEN PARALLEL TRANSPORTATION FACILITY AND BART CONFIGURATION (IN MILES)

BART Configuration	Surrounding Movement Pattern①	Type of parallel transportation facility				No Previous Barrier	Totals
		Freeway	Railroads③		Arterial		
			Heavy Use	Light Use			
Subway	extensive	.8		.2	9.6	1.2	11.8
	light	.3				7.7④	8.0
Surface	extensive	4.5	4.0	3.0			11.5
	light	5.8	5.5	2.0		1.4	14.7
Aerial	extensive	3.0	13.0②	5.5	2.2②		23.7
	light					1.3	1.3
Totals		14.4	22.5	10.7	11.8	11.6④	71.0

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① Provides the distinction between areas where there were no streets or no streets crossing the BART alignment prior to BART (LIGHT), and areas of moderate to heavy vehicular cross-traffic prior to BART (EXTENSIVE).

② 5.4 miles of aerial structure between Lake Merritt and Bayfair stations is alongside a major arterial, as well as heavily used railroad.

③ The Southern Pacific and Western Pacific tracks in Richmond and Alameda County are heavily used (12 to 30 trains per day in both directions), while the Santa Fe tracks in Richmond, El Cerrito and Albany, and the Sacramento Northern (now abandoned) in Walnut Creek and Concord are lightly used (0 to 2 trains per day in both directions).

④ 7.6 miles in Trans-bay Tube and Berkeley Hills Tunnel.

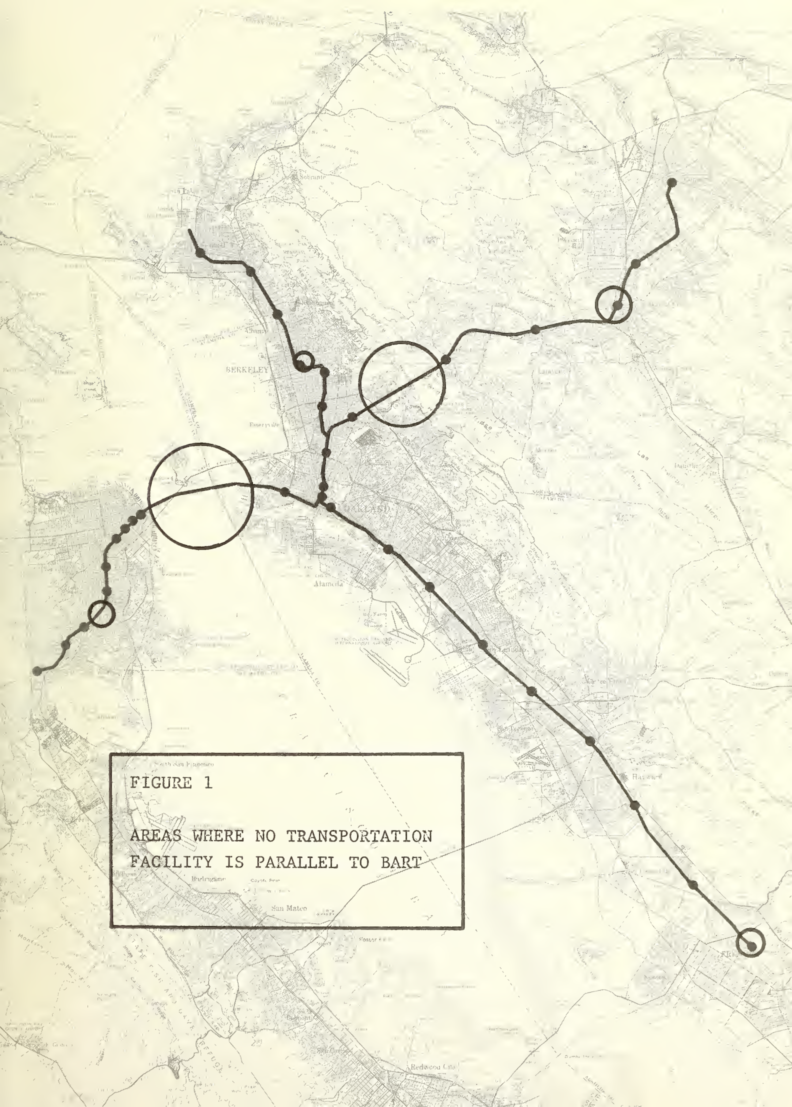


FIGURE 1

AREAS WHERE NO TRANSPORTATION FACILITY IS PARALLEL TO BART

Conclusions:

In areas where pre-existing adjacent transportation facilities were weak or presented non-existent barriers, BART is frequently either in a subway or on an aerial structure, thus having minimal impact on surrounding movement patterns.

Where prior transportation facilities acted as strong barriers, particularly in predominantly residential areas, BART is generally at-grade or on a berm and has provided extensive grade separations for both itself and the freeways or railroads that predated it.

By locating approximately half of the BART line adjacent to transportation facilities which were previously strong barriers to movement, many potential circulation conflicts were avoided because of the way development had grown around these other transportation facilities. Grade crossings were generally few in number; many grade separations had already been provided or planned and sensitive land uses were often found to be oriented away from the barriers to avoid access conflicts.

Research Question 2: Which BART line and station configurations have created barriers? Which have improved access and ease of movement?

The greatest potential for restricted movement and access results from the approximately 26 miles of BART line at-grade or on a berm. Although the tracks themselves constitute a barrier, the fencing used to prevent tresspassing on the BART right-of-way forms a solid barrier at ground level. There are examples of this condition in Richmond, Hayward and Concord. However, to counteract this barrier effect extensive grade separated crossings of BART, (and adjacent freeways and railroads) were built or improved by BART. These grade

separated crossings have generally improved safety and maintained or improved access across BART and previous rights-of-way.

The 25 miles of aerial structures have created few if any restrictions to movement because of the ability to span cross streets and because of the minimal lateral displacement required by the narrow, single columns. A primary reason for using this configuration was to avoid disruption of existing movement patterns. Aerial structures have been used extensively in El Cerrito and Albany; along Grove Street, the Nimitz Freeway and 7th Street in Oakland. There are approximately 9 miles of aerial structure between Lake Merritt and Bayfair stations. In El Cerrito and Albany lightly used parallel railroad tracks were relocated to accomodate aerial structures and elevated stations.

BART subway structures present no new barriers to surface movement and have usually been accompanied by local improvement to surface streets, such as Market Street in San Francisco, Shattuck Avenue in Berkeley, and Broadway in Oakland. These improvements have generally resulted in better traffic flow for pedestrians and vehicles.

BART stations themselves have had little effect on through circulation. Some stations with parking lots, such as North Berkeley, Ashby, and Bayfair, have eliminated portions of local streets, while others such as Fruitvale, South Hayward and Orinda have rerouted and improved main arteries. Several have improved pedestrian movement by making it safer, shorter or more comfortable. Specifically, San Francisco stations on Market Street and downtown Oakland stations, as well as Bayfair, Orinda, Lafayette, Richmond and Coliseum stations have provided such pedestrian amenities. Downtown stations in San Francisco and Oakland provide covered, below grade mezzanines which permit all downtown pedestrians to walk along and across portions of major streets free from conflicts with vehicular traffic

and protected from the elements. Bayfair, Orinda, Lafayette, Richmond and Coliseum stations have included grade separated pedestrian facilities, which cross an adjacent freeway or conventional rail line as well as crossing the BART line.

Among station configurations, the greatest potential source of barriers are those stations which are above-grade, on berm or at-grade. These stations present the same impenetrable barrier, as fenced BART line and require grade separated crossings. Pedestrian and vehicular grade separations were provided at such stations as Richmond, Bayfair, and Lafayette.

Conclusions:

There is no simple answer to Research Question 2. In general, the construction of BART, in all its configurations, has resulted in improved access and patterns of movement. Each line and station configuration has made unique contributions to improved access. The interaction between particular configurations and adjacent potential barriers, as well as previous vehicular and pedestrian movement patterns, determines the nature of the effect at any given point. BART line configurations, have usually been selected to minimize conflicts with local conditions, and have often improved movement patterns. For example, where adjacent railroad tracks are heavily used, in southern Alameda County, an at-grade configuration was selected and extensive grade separations were undertaken (Hayward).

In contrast, along the little used Santa Fe right-of-way through Albany and El Cerrito, an aerial structure was selected, because grade separating the railroad would serve little purpose and would have been very expensive.

Research Question 3: To what extent and where have local streets and pedestrian paths been blocked or eliminated by BART?

Research Question 4: To what extent and where have improvements to vehicular and pedestrian facilities resulted from the construction of BART?

BART's alignment and configuration were selected in such a way that few streets were blocked. (See Appendices A and B) Where streets were blocked, it was usually at the request of local governments. The City of Berkeley has closed streets surrounding the North Berkeley station in an effort to prevent BART traffic from filtering into the surrounding residential neighborhood.

For some stations, such as North Berkeley, Daly City and Fruitvale, local streets were removed to make space for station parking lots. The need for these streets was eliminated when the buildings along them were removed.

There are numerous instances of BART-related improvements in both vehicular and pedestrian crossings of BART and previous barriers (See Appendices A and B). These improvements are predominantly in areas where BART is running at-grade or on a berm, such as Richmond and Hayward. Most new roadway provided by BART is also in areas where BART is on the surface. Examples are in Hayward, San Lorenzo, and Concord.

In several areas pedestrian access has been made safer, although not always as convenient, by the construction or remodeling of pedestrian grade separations. These facilities have been provided primarily in areas with heavy pedestrian traffic associated with public schools, such as Hayward, San Francisco, Concord and Richmond. In

Richmond and Hayward citizens sought more points of access than BART ultimately provided.

In Albany and El Cerrito, where BART is on an aerial structure, a landscaped strip below the structure was provided as a demonstration project. The El Cerrito and Albany Linear Parks have created 3½ miles of continuous pedestrian path through a predominantly residential area.

Improvements or reroutings of streets have occurred at virtually every station in the system. These have been improvements to both vehicular and pedestrian facilities. The construction of all three downtown subways was coordinated with substantial local street improvements for pedestrians and vehicles. In somewhat the same way, BART alignment and construction was coordinated with the construction of the Grove-Shafter Freeway, and substantial improvements to Highway 24 from Orinda to Walnut Creek.

Conclusions:

Rather than impose barriers by blocking vehicular and pedestrian access, BART has generally left existing circulation patterns untouched or improved them. Where streets and pedestrian paths have been blocked, it has generally been at the request of the local jurisdictions, according to BART staff.

Vehicular movement has generally been improved in both ease and safety through railroad and freeway grade separations, street widenings, signalization and rerouting. New roadways have provided access to or through previously inaccessible areas.

Research Question 5: What effect, if any, has the existence of the Trans-bay Tube had on maritime activity on the Bay?

Based on conversations with representatives of the Port of Oakland and the Coast Guard Vessel Traffic System, the maritime traffic authority on San Francisco Bay, the BART Trans-bay Tube has no effect on maritime activities on the Bay.

SUMMARY

The relationship between regional transportation improvements and local barrier effects is an important issue that is addressed by this report. In general, while BART is basically a regional transit improvement, its implementation has also resulted in improvements to local movement systems as seen in Table 2. Figure 2 shows the locations of changes in movement related to BART.

TABLE 2

NUMBER OF CHANGES IN MOVEMENT FACILITIES BY BART CONFIGURATION

LAND USE	BART CONFIGURATION	NUMBER OF CHANGES IN MOVEMENT FACILITIES		
		NEW FACILITIES	IMPROVED FACILITIES	BLOCKED FACILITIES
residential	aerial	4	1	1
	surface	22	3	6
	subway	--	1	3
non-residential	aerial	3	5	1
	surface	10	4	--
	subway	1	2	1

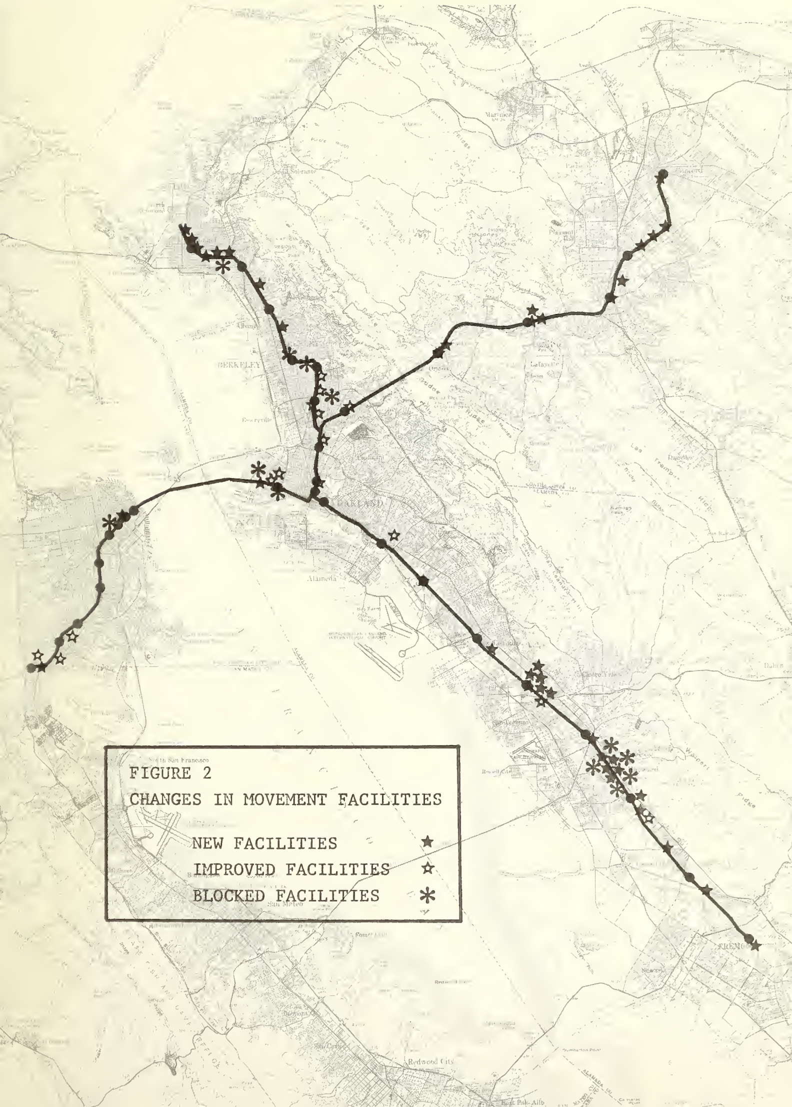


FIGURE 2

CHANGES IN MOVEMENT FACILITIES

Transportation facilities, such as freeways and railroads, existing or planned before BART was designed and built were an important influence on the alignment and configuration of the BART system. These facilities, acting as prior barriers, frequently afforded BART an alignment having few local circulation conflicts.

Pedestrian access has been provided in several places across the BART alignment, and previous adjacent transportation facilities. While these facilities improve pedestrian safety, they are often less convenient than prior access was, and in some areas, controversies developed as communities sought more points of access than BART provided.

Vehicular movement was almost always improved and made safer through grade separations. Few streets were blocked and those were usually requested by local governments. Some streets were purposely closed in an effort to protect surrounding neighborhoods from BART related traffic.

As BART service was expanded, the value of direct access to stations and mezzanines became better understood. Several special entrances to BART subway mezzanines, and grade separated access to a shopping center and sports stadium complex have been provided.

The BART Trans-bay Tube, while causing some minimal conflicts with maritime traffic during construction, now has no effect on San Francisco Bay shipping activity.

The barrier effects of BART's subway construction in downtown areas and improvements to utility networks in these areas are not actually within the scope of the Environment Project. However, they are

discussed in this report because of their importance to the study of BART's barrier impacts.

Although the Environment Project is intended to assess post-construction impacts of BART, a study of the barrier impacts would be incomplete if it did not mention the barriers created by BART subway construction. Cut-and-cover construction for BART subway in the downtown areas of San Francisco, Oakland and Berkeley caused considerable temporary disruption to vehicular and pedestrian traffic. The location of these downtown areas in citywide traffic patterns has made barrier impacts particularly intense. The period of disruption ranged from 2 years in Berkeley to over 7 years in San Francisco. Although vehicles were inconvenienced by this construction, pedestrians were perhaps most seriously affected because of the heavy pedestrian traffic in downtown areas.

There are significant benefits in having access to a mass transit system in downtown areas, and in having that system below street level, thus minimizing conflicts with surface activities. However, the price paid for these present and long-term benefits was years of major disruption of vehicular and pedestrian traffic.

Though not directly involved with effects on movement, the effect of BART subway construction on the utility networks beneath downtown areas and San Francisco Bay should be mentioned. The construction of BART has resulted in substantial reorganization, rerouting and repair of subsurface utility lines, and trans-bay communication and electrical cables. It also provided an opportunity for comprehensive mapping of these lines, many of whose exact locations were previously unknown.

APPENDIX "A"

Changes in movement facilities brought about or influenced by the construction of BART.

SEQUENTIAL LISTING BY LINE

STREETS & PEDESTRIAN PATHS BLOCKED	INITIATED BY	IMPROVEMENTS TO VEHICULAR AND PEDESTRIAN MOVEMENT
DALY CITY LINE		
	BART	San Pedro Ave. improvements
	BART	Modifications to St. Charles St. pedestrian/vehicular grade separation
	BART	Extension of Cayuga Playground pedestrian grade separation
	BART	Extension of Balboa Park pedestrian grade separation
Leavenworth St. termination	San Francisco	
	San Francisco	5th St. extension through Hallidie Plaza to north side of Market
	San Francisco	Market St. surface improvements
Maritime St. termination	Port of Oakland, U.S. Army, U.S. Navy	
	Port of Oakland, U.S. Army, U.S. Navy	Maritime St. pedestrian grade separation
	Port of Oakland, U.S. Army, U.S. Navy	Maritime St. realignment
	Port of Oakland	7th St. widening
Center St. discontinued south of 7th St. at Oakland West station	BART	
FREMONT LINE		
	Oakland	Surface improvements to Broadway
	BART	E. 12th St. realignment around Fruitvale station parking lot
	Alameda County/BART	Pedestrian grade separation to Coliseum Complex from Coliseum station
	San Leandro	Extension of San Leandro Boulevard from Williams St. to Washington Ave.
	BART	159th St. connection between Foothill and Hesperian Blvds.
	BART	Pedestrian grade separation between Bayfair station parking areas
	Bayfair Shopping Center	Vehicular access to Bayfair Shopping Center from 159th St.
	Bayfair Shopping Center	Pedestrian access from Bayfair Shopping Center to station (in progress)
	Alameda County	Frontage road between Ashland Ave. and 159th St.
	Alameda County	Ashland Ave. grade separation
	BART	Improvements to pedestrian grade separation beneath Highway 238

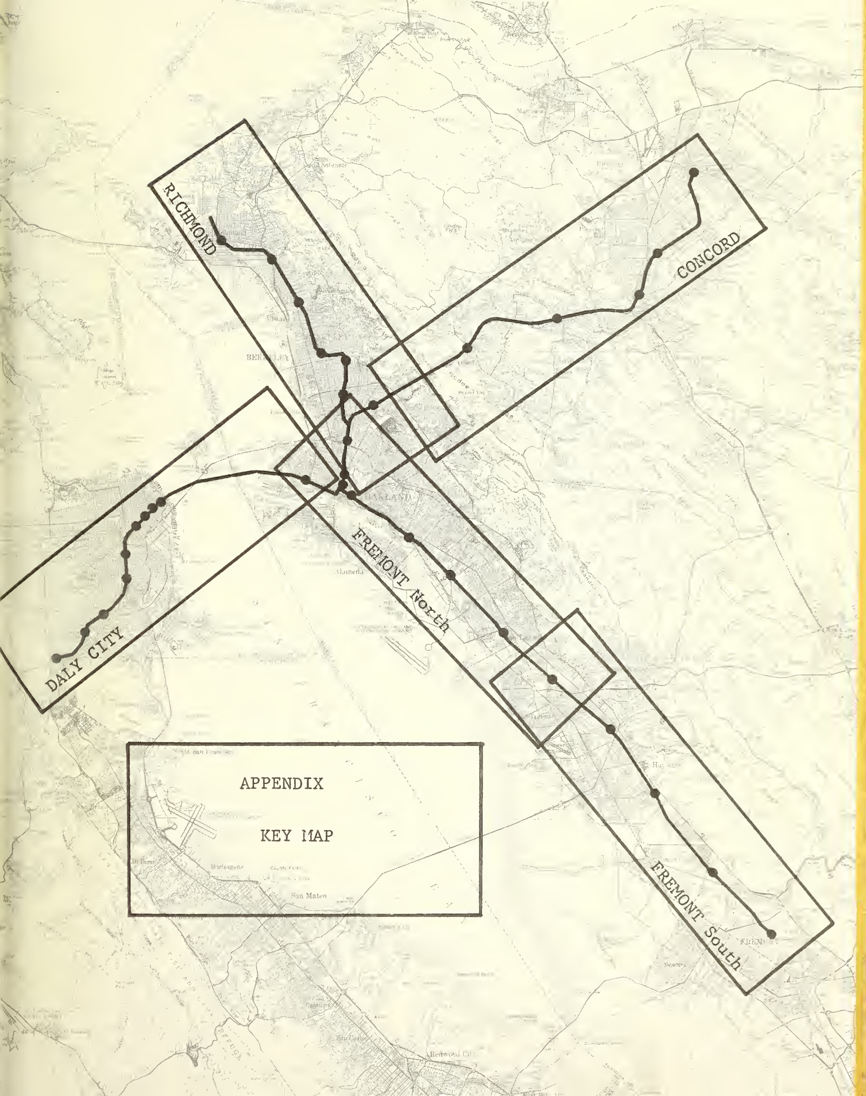
STREETS & PEDESTRIAN PATHS BLOCKED	INITIATED BY	IMPROVEMENTS TO VEHICULAR AND PEDESTRIAN MOVEMENT
	Hayward	"D" Street grade separation
Sycamore St. discontinued across WPRR and BART right-of-way	Hayward	
	Hayward	Sycamore St. pedestrian grade separation
Continuous pedestrian access across WPRR right-of-way blocked by BART fences	BART	
	Hayward	Orchard Ave. grade separation
Berry St. discontinued across WPRR and BART right-of-way	Hayward	
	Hayward	Harder Rd. grade separation
	Hayward	Whitman Ave. frontage road improvements
Sorenson Rd. discontinued across WPRR and BART right-of-way	Hayward	
Removal of pedestrian underpass across WPRR right-of-way	Hayward	
	Hayward	Sorenson Rd. pedestrian grade separation
	Hayward	Dixon Rd. extension to Tennyson Rd.
	Hayward	Industrial Parkway grade separation
	State Division of Highways	WPRR realignment to accomodate future freeway right-of-way (Highway 238)
	Hayward	Whipple Rd. grade separation
	Union City	Niles Blvd. grade separation
	Fremont	Walnut Way connected
RICHMOND LINE		
	BART	40th Ave. improvements at MacArthur station
	Oakland	Widening and median separation of Grove St.
	Berkeley	Reconstruction of Adeline/Grove intersection
Prince St. discontinued between Tremont St. and Grove St.	BART	
	Berkeley	Ashby Ave. surface improvements at Adeline St.
	Berkeley	Shattuck Ave. and Adeline St. surface improvements - University Ave. to Grove St.

STREETS & PEDESTRIAN PATHS BLOCKED	INITIATED BY	IMPROVEMENTS TO VEHICULAR AND PEDESTRIAN MOVEMENT
California St. discontinued between Delaware and Hearst	Berkeley	
Short St. and Francisco St. Cul de Sacs, and Virginia St. diverter	Berkeley	
	BART/Albany	Albany Linear Park
	BART/El Cerrito	El Cerrito Linear Park
Continuous pedestrian access across Santa Fe right-of-way blocked by BART fences	BART	
	Richmond	37th Ave. grade separation
	Richmond	Nicholl Park pedestrian grade separation
	Richmond	23rd. St. grade separation (proposed - funds committed)
	Richmond	Nevin Ave. pedestrian grade separation through Richmond station
	Richmond	Barrett St. grade separation
	Richmond	Kearny St. grade separation
CONCORD LINE		
	BART	College Ave. improvements at Rockridge station
	State Division of Highways	Improvements to Camino Pablo Rd. under the freeway and Orinda station
	State Division of Highways	Grade separated path from north to south side of the freeway at Orinda station
	State Division of Highways	Pedestrian grade separation through Lafayette station and freeway
	State Division of Highways	Deer Hill Rd. extension
	State Division of Highways	1st. Street extension and grade separation
	Walnut Creek	Ygnacio Valley Rd. improvements
	Walnut Creek	Jones Rd. - frontage road
	Concord	Bancroft Rd. grade separation
	BART	Oak Grove school pedestrian grade separation
	Concord	Oak Grove Rd. grade separation
	Concord	Monument Blvd. - connection to Clayton Rd. (proposed)

APPENDIX "B"

Changes in movement facilities
brought about or influenced by
the construction of BART.

MAPPING BY LINE



APPENDIX

KEY MAP

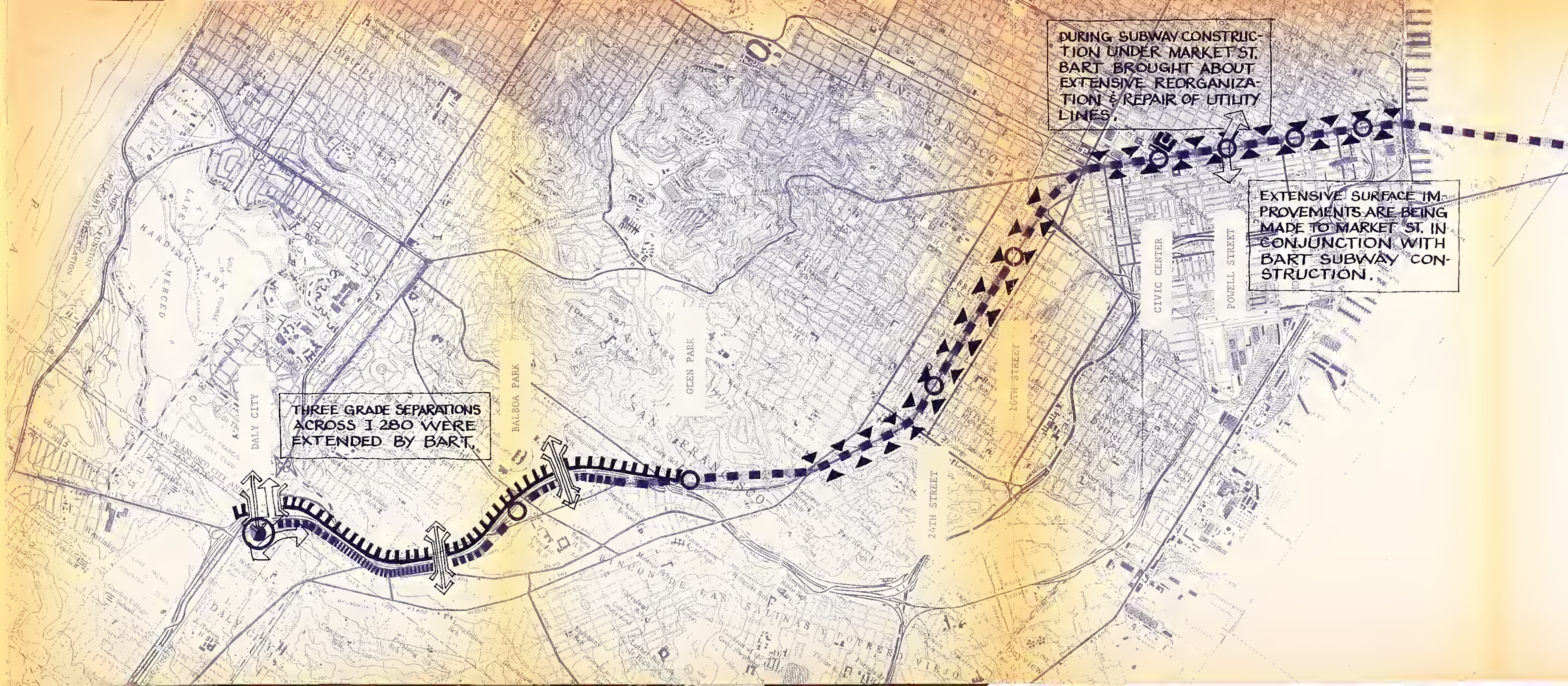
DALY CITY LINE

BART RELATED BARRIERS AND CHANGES IN MOVEMENT

THE ENVIRONMENT PROJECT
BART IMPACT PROGRAM
DECEMBER 1974

LEGEND

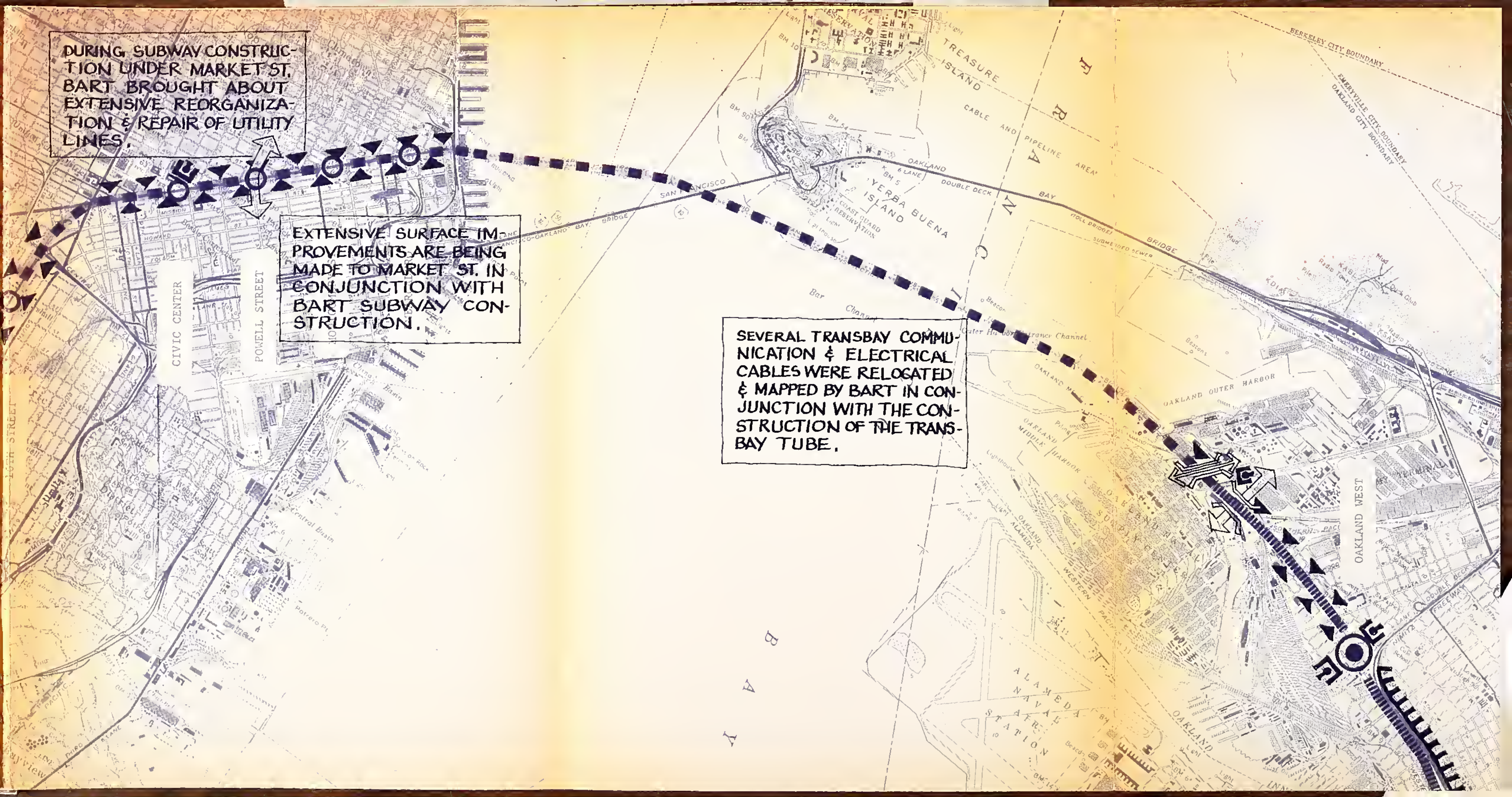
		BART CONFIGURATION AND FACILITIES	
FREEWAY	┸┸┸┸┸		
RAILROAD	┼──┼	SUBWAY LINE	■ ■ ■
ARTERIAL	▼ ▼ ▼	AERIAL LINE	‖‖‖‖‖‖
		LINE AT GRADE	▮▮▮▮▮▮
STREET IMPROVEMENT	⇔	LINE ON BERM	▰▰▰▰
PEDESTRIAN IMPROVEMENT	↔	ABOVE GRADE STATION WITH PARKING LOT	◉
GRADE SEPARATION	⌣⌢	SUBWAY STATION WITHOUT PARKING LOT	○
STREET BLOCKAGE	⊐	SUBWAY STATION WITH PARKING LOT	◎
		MAINTENANCE/STORAGE YARD	▨



THREE GRADE SEPARATIONS ACROSS I 280 WERE EXTENDED BY BART.

DURING SUBWAY CONSTRUCTION UNDER MARKET ST. BART BROUGHT ABOUT EXTENSIVE REORGANIZATION & REPAIR OF UTILITY LINES.

EXTENSIVE SURFACE IMPROVEMENTS ARE BEING MADE TO MARKET ST. IN CONJUNCTION WITH BART SUBWAY CONSTRUCTION.



DURING SUBWAY CONSTRUCTION UNDER MARKET ST. BART BROUGHT ABOUT EXTENSIVE REORGANIZATION & REPAIR OF UTILITY LINES.

EXTENSIVE SURFACE IMPROVEMENTS ARE BEING MADE TO MARKET ST. IN CONJUNCTION WITH BART SUBWAY CONSTRUCTION.

SEVERAL TRANSBAY COMMUNICATION & ELECTRICAL CABLES WERE RELOCATED & MAPPED BY BART IN CONJUNCTION WITH THE CONSTRUCTION OF THE TRANSBAY TUBE.

CONCORD LINE

BART RELATED BARRIERS AND CHANGES IN MOVEMENT

NORTH

0 1 2 3 4

SCALE IN 1000'S OF FEET

THE ENVIRONMENT PROJECT
BART IMPACT PROGRAM
DECEMBER 1974

LEGEND

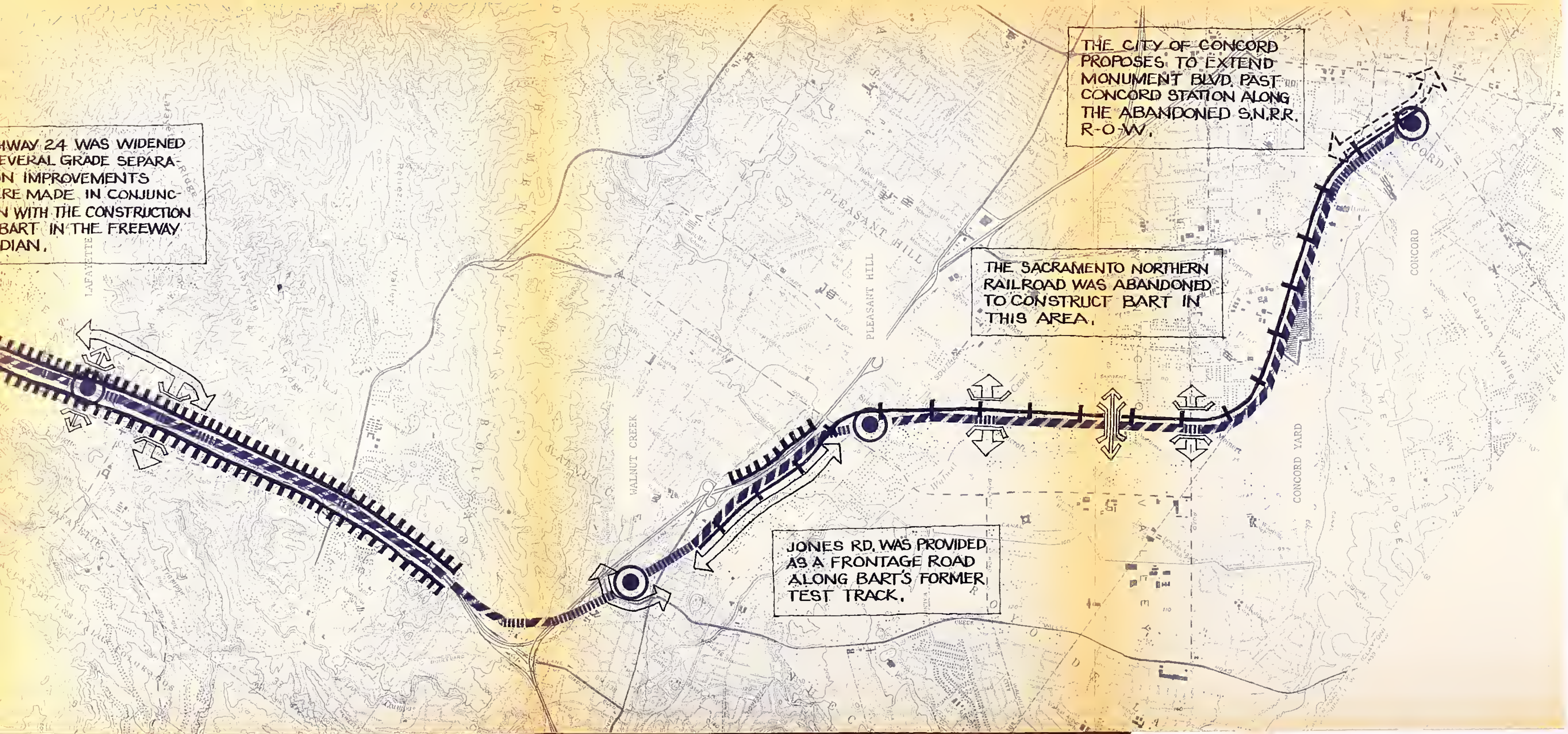
FREEWAY	▥
RAILROAD	┼─┼
ARTERIAL	▼ ▼ ▼
STREET IMPROVEMENT	⇔
PEDESTRIAN IMPROVEMENT	⟺
GRADE SEPARATION	⌣ ⌢
STREET BLOCKAGE	⊐

BART CONFIGURATION AND FACILITIES:

SUBWAY LINE	■ ■ ■
AERIAL LINE	‖‖‖‖‖‖
LINE AT GRADE	▪▪▪▪▪▪▪
LINE ON BERM	▰▰▰▰
ABOVE GRADE STATION WITH PARKING LOT	◉
SUBWAY STATION WITHOUT PARKING LOT	○
SUBWAY STATION WITH PARKING LOT	◎
MAINTENANCE/STORAGE YARD	▨

HIGHWAY 24 WAS WIDENED & SEVERAL GRADE SEPARATION IMPROVEMENTS WERE MADE IN CONJUNCTION WITH THE CONSTRUCTION OF BART IN THE FREEWAY MEDIAN.

JONES R
AS A FRO
ALONG
TEST TI



HWAY 24 WAS WIDENED
EVERAL GRADE SEPARA-
N IMPROVEMENTS
RE MADE IN CONJUNC-
N WITH THE CONSTRUCTION
BART IN THE FREEWAY
DIAN.

THE CITY OF CONCORD PROPOSES TO EXTEND MONUMENT BLVD. PAST CONCORD STATION ALONG THE ABANDONED S.N.R.R. R-O-W.

THE SACRAMENTO NORTHERN RAILROAD WAS ABANDONED TO CONSTRUCT BART IN THIS AREA.

JONES RD. WAS PROVIDED AS A FRONTAGE ROAD ALONG BART'S FORMER TEST TRACK.

RICHMOND LINE

BART RELATED BARRIERS AND CHANGES IN MOVEMENT

NORTH

0 1 2 3 4

SCALE IN 1000'S OF FEET

THE ENVIRONMENT PROJECT
BART IMPACT PROGRAM
DECEMBER 1974

LEGEND

FREEWAY	▥	BART CONFIGURATION AND FACILITIES:	
RAILROAD	┼──┼	SUBWAY LINE	■ ■ ■
ARTERIAL	▼ ▼ ▼	AERIAL LINE	‖‖‖‖‖‖
		LINE AT GRADE	▪▪▪▪▪▪
STREET IMPROVEMENT	⇔	LINE ON BERM	▰▰▰▰
PEDESTRIAN IMPROVEMENT	⟺	ABOVE GRADE STATION WITH PARKING LOT	◉
GRADE SEPARATION	⌣ ⌢	SUBWAY STATION WITHOUT PARKING LOT	○
STREET BLOCKAGE	⊐	SUBWAY STATION WITH PARKING LOT	◎
		MAINTENANCE/STORAGE YARD	▨

BART PROVIDED ONE PEDESTRIAN GRADE SEPARATION AT NICOLL PARK, ALTHOUGH THE COMMUNITY PUSHED FOR TWO IN THIS AREA.

A GRADE SEPARATION FOR 23RD AVE. IS PLANNED AND BART HAS COMMITTED FUNDS FOR IT.

SANTA FE R.R. TRACKS THROUGH ALBANY, EL CERRITO & RICHMOND ARE LIGHTLY USED & MAY SOON BE ABANDONED.

LINEAR PARKS WERE PROVIDED BY A FEDERAL DEMONSTRATION GRANT ALONG BART AERIAL LINE IN EL CERRITO & ALBANY.

BART SUBWAY CONSTRUCTION ALONG HEARST AVE. HAS PROVIDED SPACE TO WIDEN & IMPROVE IT.

SEVERAL STREET CLOSINGS AROUND THE NORTH BERKELEY STATION WERE UNDERTAKEN BY THE CITY OF BERKELEY TO PROTECT THE SURROUNDING NEIGHBORHOOD FROM BART-RELATED TRAFFIC.

DURING SUBWAY CONSTRUC
SHATTUCK AVE. BART BROU
EXTENSIVE REORGANIZAT
REPAIR OF UTILITY LINE

SURFACE IMPROVEMENTS
VEHICULAR & PEDESTRIAN
WERE MADE TO SHATTUCK A
ING BART SUBWAY CONS

SANTA FE R.R. TRACKS THROUGH ALBANY, EL CERRITO & RICHMOND ARE LIGHTLY USED & MAY SOON BE ABANDONED.

BART SUBWAY CONSTRUCTION ALONG HEARST AVE. HAS PROVIDED SPACE TO WIDEN & IMPROVE IT.

DURING SUBWAY CONSTRUCTION UNDER SHATTUCK AVE. BART BROUGHT ABOUT EXTENSIVE REORGANIZATION AND REPAIR OF UTILITY LINES.

SURFACE IMPROVEMENTS FOR BOTH VEHICULAR & PEDESTRIAN TRAFFIC WERE MADE TO SHATTUCK AVE. FOLLOWING BART SUBWAY CONSTRUCTION.

T PROVIDED ONE PEDES-
AN GRADE SEPARATION
NICOLL PARK, ALTHOUGH
E COMMUNITY PUSHED
R TWO IN THIS AREA.

LINEAR PARKS WERE PROVIDED BY A FEDERAL DEMONSTRATION GRANT ALONG BART AERIAL LINE IN EL CERRITO & ALBANY.

THE GROVE-SHAFTER FREEWAY & BART WERE COORDINATED IN BOTH DESIGN & CONSTRUCTION.

A GRADE SEPARATION FOR 23RD AVE. IS PLANNED AND BART HAS COMMITTED FUNDS FOR IT.

SEVERAL STREET CLOSINGS AROUND THE NORTH BERKELEY STATION WERE UNDERTAKEN BY THE CITY OF BERKELEY TO PROTECT THE SURROUNDING NEIGHBORHOOD FROM BART-RELATED TRAFFIC.

FREMONT LINE North

BART RELATED BARRIERS AND CHANGES IN MOVEMENT

NORTH

0 1 2 3 4
SCALE IN 1000'S OF FEET

THE ENVIRONMENT PROJECT
BART IMPACT PROGRAM
DECEMBER 1974

LEGEND

FREEWAY	⊔⊔⊔⊔⊔
RAILROAD	┼──┼
ARTERIAL	▼ ▼ ▼
STREET IMPROVEMENT	⇔
PEDESTRIAN IMPROVEMENT	⟺
GRADE SEPARATION	⌣ ⌢
STREET BLOCKAGE	⊐

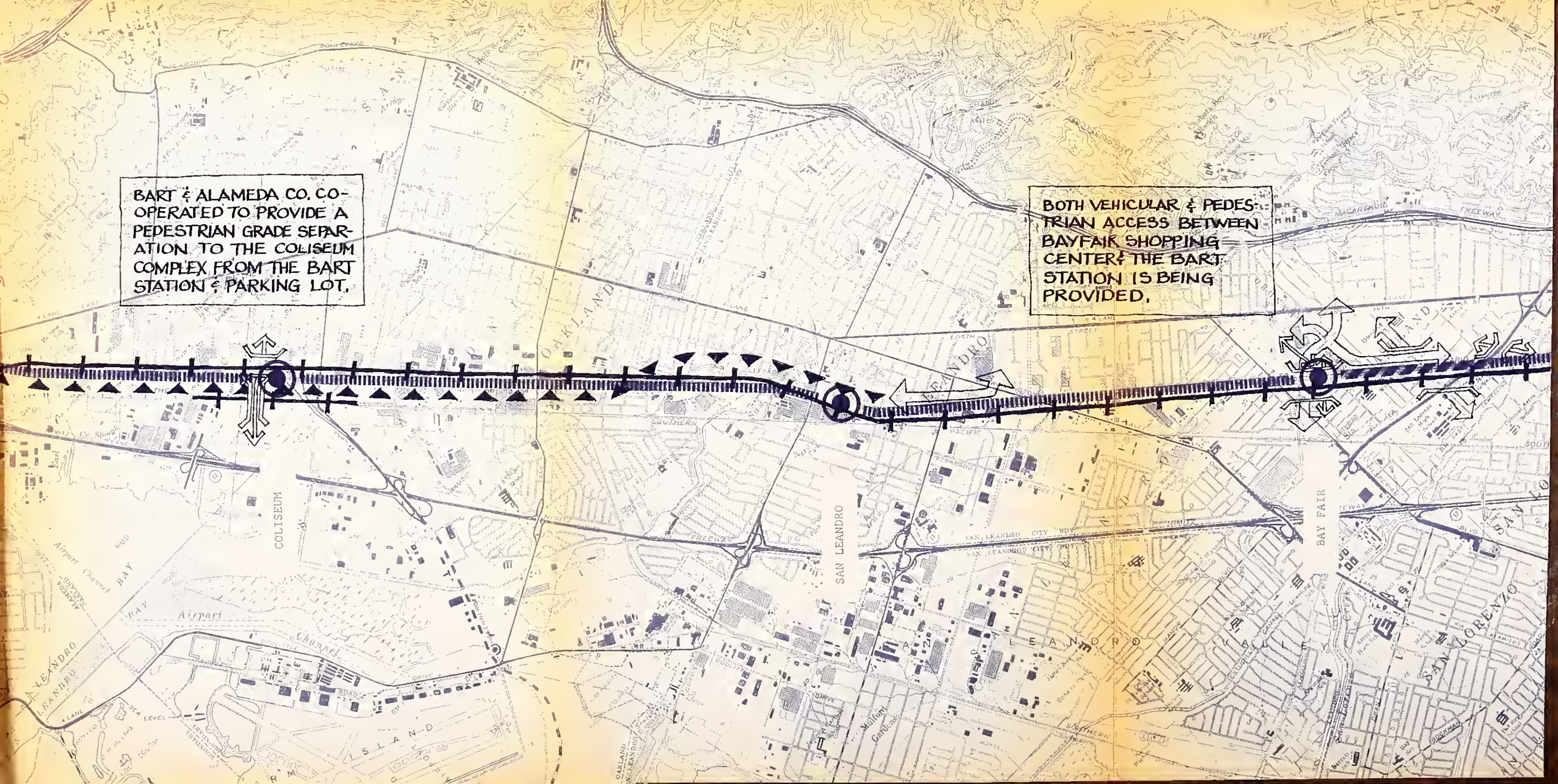
BART CONFIGURATION AND FACILITIES

SUBWAY LINE	■ ■ ■
AERIAL LINE	❙❙❙❙❙❙❙❙
LINE AT GRADE	▮▮▮▮▮▮
LINE ON BERM	▰▰▰▰
ABOVE GRADE STATION WITH PARKING LOT	◉
SUBWAY STATION WITHOUT PARKING LOT	○
SUBWAY STATION WITH PARKING LOT	◎
MAINTENANCE/STORAGE YARD	▨

THE CITY OF OAKLAND MADE VEHICULAR & PEDESTRIAN SURFACE IMPROVEMENTS TO BROADWAY IN CONJUNCTION WITH BART SUBWAY CONSTRUCTION.

DURING SUBWAY CONSTRUCTION UNDER BROADWAY, BART BROUGHT ABOUT EXTENSIVE REORGANIZATION AND REPAIR OF UTILITY LINES.

BART & ALAMEDA CO. CO-OPERATED TO PROVIDE A PEDESTRIAN GRADE SEPARATION TO THE COLISEUM COMPLEX FROM THE BART STATION & PARKING LOT.

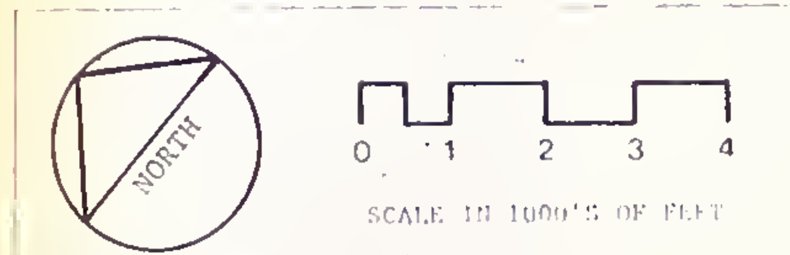


BART & ALAMEDA CO. CO-OPERATED TO PROVIDE A PEDESTRIAN GRADE SEPARATION TO THE COLISEUM COMPLEX FROM THE BART STATION & PARKING LOT.

BOTH VEHICULAR & PEDESTRIAN ACCESS BETWEEN BAYFAIR SHOPPING CENTER & THE BART STATION IS BEING PROVIDED.

FREMONT LINE South

BART RELATED BARRIERS AND CHANGES IN MOVEMENT



SCALE IN 1000'S OF FEET

THE ENVIRONMENT PROJECT
BART IMPACT PROGRAM
DECEMBER 1974

LEGEND

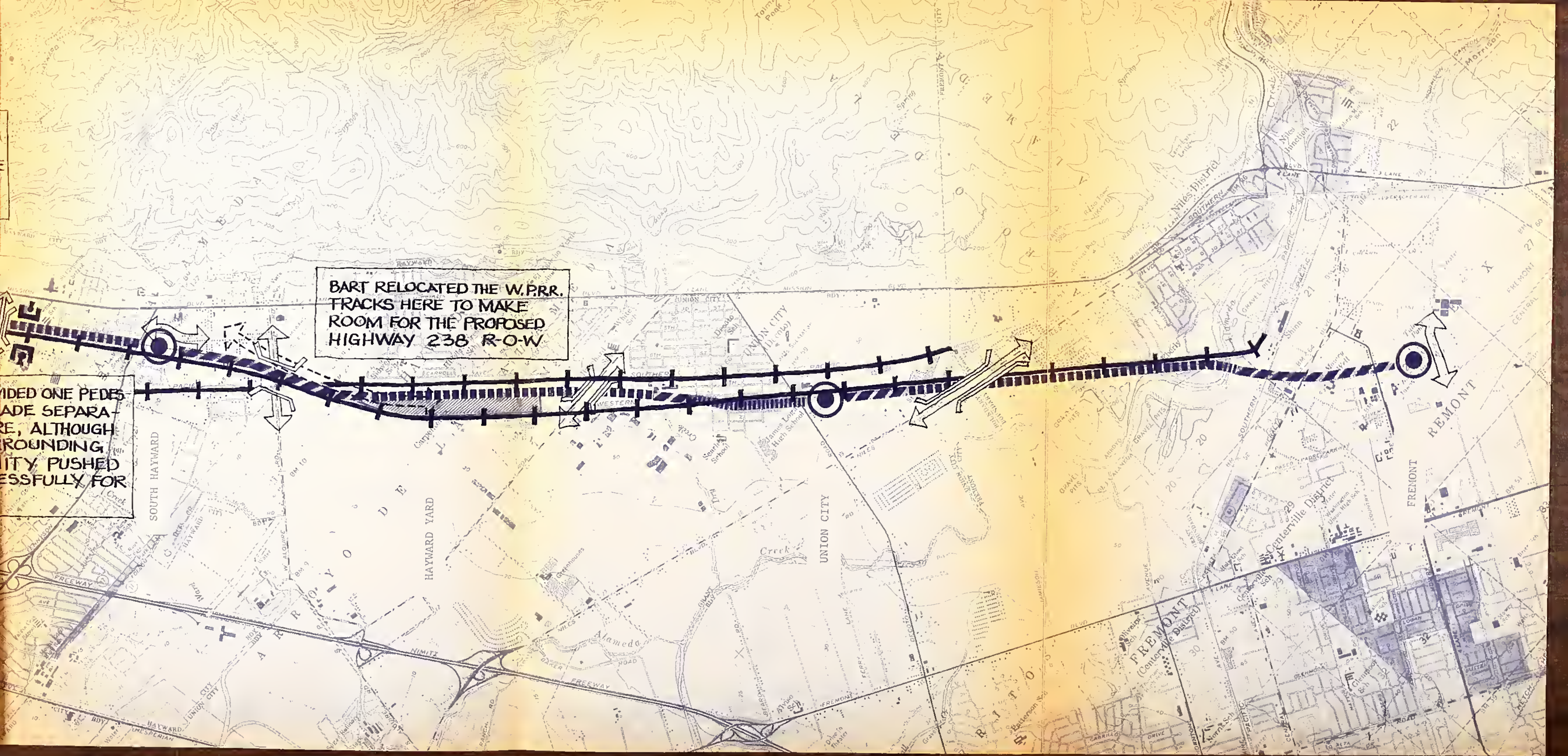
FREEWAY	BART CONFIGURATION AND FACILITIES.
RAILROAD	SUBWAY LINE ■ ■ ■
ARTERIAL ▼ ▼ ▼	AERIAL LINE
	LINE AT GRADE
STREET IMPROVEMENT ⇔	LINE ON BERM
PEDESTRIAN IMPROVEMENT ⇔	ABOVE GRADE STATION WITH PARKING LOT ◉
GRADE SEPARATION	SUBWAY STATION WITHOUT PARKING LOT ○
STREET BLOCKAGE	SUBWAY STATION WITH PARKING LOT ◎
	MAINTENANCE/STORAGE YARD ▨

THESE THREE STREET CLOSINGS ACROSS BART AND W.P.R.R. R-O-W WERE REQUESTED BY THE CITY OF HAYWARD

WHITMAN AVE WAS IMPROVED AS A FRONTAGE RD. ALONG THIS AT-GRADE LINE SEGMENT BY BART.

BART PROVIDED ONE PEDESTRIAN GRADE SEPARATION HERE, ALTHOUGH THE SURROUNDING COMMUNITY PUSHED UNSUCCESSFULLY FOR MORE.

BART RELOCATED THE W.P.R.R. TRACKS HERE TO MAKE ROOM FOR THE PROPOSED HIGHWAY 238 R-O-W.



BART RELOCATED THE W.P.R.R. TRACKS HERE TO MAKE ROOM FOR THE PROPOSED HIGHWAY 238 R-O-W

VIDED ONE PEDES-
ADE SEPARA-
RE, ALTHOUGH
ROUNDING
ITY PUSHED
ESSFULLY FOR